



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of: )  
SHIVELY ET AL : Examiner Kevin R. Kruer  
Application No.: 10/729,587 ) Group Art unit 1773  
Filed: June 12, 2003 :  
For : FIRE RETARDANT SHADES  
Date:

Commissioner for Patents  
Washington, D.C. 20231

DECLARATION OF ANTHONY BRIAN PORT

Sir

I, Anthony Brian Port, hereby declare:

1. I am an employee of CPFilms Inc. of The Great Road, Fieldale, Virginia who are the Assignee of the Inventors, and where I am employed as a Senior Research Chemist in the R & T Group and thus I am familiar with the application and the invention claimed therein.

2. I graduated with First Class Honours in Chemistry and Polymer Science from the University of Wales in the United Kingdom (U.K.) in 1973, and a Ph.D for graduate studies on polymers at the University of Manchester Institute

if Science and Technology, UK in 1977. I am a Chartered Chemist and Member of the Royal Society of Chemistry, UK, and a Member of the American Chemical Society.

3. I have held senior positions in research and development in government and national laboratories, academia and industry. Since 1994 I have been involved with the Research, Technology and Product Development activities of CPFilms Inc., who are a world leader in composite films used for the manufacture of solar control film and shade materials.

4. I have reviewed the Office Communications dated 14<sup>th</sup> July 2006 and 22<sup>nd</sup> Jan 2007 and am aware that the Examiner has noted that no evidence has been filed in relation to the comparative fire retardant properties and weatherability of the materials of the present invention and those of Valinski.

5. Valinski was an employee of CPFilms Inc. at the time of the making of the invention disclosed in PCT application WO 01/683360 (Valinski), and I am familiar with both the present application and the invention claimed therein and of the disclosure in the Valinski.

6. The invention in the present application is directed, inter alia, to a clear transparent composite fire retardant shade material for use as a sun shade or blind having an outer side in use facing the sun and an inner side

facing away from the sun and which comprises a film composite having a first transparent PET film outer layer containing a UV absorber, a further transparent PET film inner layer also containing UV absorber adhered to the inner side of the first film layer using a polyurethane resin adhesive containing 5-15% resorcinol bis (diphenyl phosphate) (RDP) fire retardant with at least one of said two PET film layers also containing a fire retardant material, the composite having a visible light transmission of upto 30% and a haze value of less than 6% and meeting fire retardant standard in accordance with German test method DIN 4102:B2 .

7. Valinski's approach was to use an FR protective hardcoat and, when the composite comprised two PET layers, to also use a FR adhesive to bond two films together. This did not work in the sense of being good enough to pass the DIN 4102: B2 test and aged very badly in sunlight (very quickly turning a deep bronze colour). Being intimately aware of the Valinski material in no way taught CPFilms how to make a shade that passed the B2 test and which overcame the problems associated with exposure, it took a lot more time and effort before we were successful. Our approach was to use a different FR additive in the laminating adhesive and to use PET film with FR additive incorporated by the manufacturer. The aging was improved by constructing the film so that the PET outer layer (facing the sun in use) incorporated a UV absorber.

8. The fire retardant standard in accordance with German Test method DIN 4102:B2 is described in exhibit A. This is one of the most exacting standards for materials used for furnishings in commercial properties (shades come into the same FR category as for curtains). In Germany, Austria and Switzerland it is only permissible to use materials which meet DIN 4102.B2 in public buildings, work place offices and refurbished buildings (architect supervised). Therefore a shade material which meets the standards of DIN 4102:B2 is suitable for use and sale in Germany, Austria and Switzerland and will meet the FR Standards set by most other countries.

9. Production Samples having a construction in accordance with Fig.6 of Valinski were tested at the Warrington Fire Research Centre in Warrington UK in June 2001 in Accordance with DIN 4102 . The samples failed the B2 standard and were assigned the lower B3 classification as is shown Exhibit B. It should be noted that a B3 classification merely denotes a failure to achieve the B2 level of performance, it is of no practical use and a product could not be offered for sale as being "FR to DIN 4102: B3".

10. The Valinski sample also suffered from poor longevity on exposure testing and tended to yellow and become brittle.

11. Production samples having a construction in accordance with Fig. 1 of the present application were tested at the Warrington Fire Research centre in Warrington UK in accordance with D4102 in November 2003 and were assigned the B2 standard as is shown in Exhibit C. Subsequently, further samples were tested at Warrington to the European standards BS EN 13823:2002 and BS EN ISO 11925-2:2002 (Exhibit D). The samples passed these tests and formal certification to the European Standard BS EN 13501-1: 2002 was obtained. It is our understanding that the European standards are closely equivalent to the stringent DIN 4102: B.2 test method such that materials certified to the European standards are approved for sale in Germany and also throughout Europe.

12. Comparative weathering tests on the Valinski film material and the material made in accordance with present Invention were conditioned in accordance with ASTM G155-00 using an Atlas Xenon Weatherometer and the optical properties measured in accordance with ASTM E308-90 using a Hunter Ultrascan XE. The unexposed samples from Valinski and in accordance with the present application had similar optical properties. After 1800 hours exposure with the aluminium coated layer to light, the total differences in colour change in the Valinski sample were approximately 15 times greater than for the present material, and in particular the Yellow Index D1925(2/c) was some 16 times greater. Representative test samples as made and weathered from Valinski and the present invention are shown in Exhibit E.

13. The vast increase in yellowing index of Valinski material during weathering tests, coupled with its failure to meet the FR standard DIN 4102: B2 meant that the Valinski material was unsuitable for commercial use. The Valinski material was withdrawn on 16<sup>th</sup> April 2002, and the US Patent Application 10/204,430 which was filed to protect the Valinski material was subsequently abandoned.

14. The weatherability problems associated with Valinski were due to the lack of understanding of the relationship between the placement of the FR coating material in the composite and the placement of Ultra Violet Absorber (UVA) in the composite. It is stated in Valinski that any of the PET sheets may optionally include a UVA ( see page 11 lines 9-13). However Valinski clearly does not understand the positional relationship between the PET layer containing UVA and the FR coating layer. In all the examples in Valinski at least one FR Coating layer 2 is an exposed layer. Indeed Valinski states on Page 10 line 25/26 that " the embodiments of the Invention may include a coating 2 on both exposed surfaces". That the UV absorber is optional is reinforced by the fact that it is claimed only in Claim 5 and in that no other sub-Claim depend back onto Claim 5. Quite clearly, Valinski did not appreciate the importance of the presence of UV absorber in regards to the FR material.

In the present invention as now claimed, the PET layers which lie either side of the FR Containing layer both include UV absorber. This is not optional. Shade constructions made in accordance with the present invention but with no UV absorbers in the PET film layers showed unacceptable yellowing in weathering experiments.

15. The present material to my knowledge is the only commercially available FR shades material which meets the requirements of DIN 4102: B2, has suitable optical properties in terms of transparency and haze, and which does not greatly yellow on aging. The Yellow Index did NOT increase after 1800 hours conditioning in the Atlas Xenon Weatherometer.

16. The present US application was filed on 6<sup>th</sup> December 2003 in order to protect the present invention.

17. I have reviewed the documents cited by the Examiner and based on my own experience and knowledge, as a polymer chemist, I would comment as follows:

17a. It is well known that Phosphorous based additives can be used in polyesters to provide some degree of FR behaviour, as is disclosed in Levchick US 6569,928, and Valinski. The whole point of Levchick is that you can improve the FR performance of P based additives in polyester compositions by using high char yielding polymeric co-

additives. The examiner is wrong in saying that Levchik teaches that RDP alone gives satisfactory overall performance. Levchik advocates and claims the use of RDP in combination with a high softening point and high char yield additive such as a phenolic resin. Furthermore, Levchik makes no reference to optical properties of the FR polyesters so produced or to the weatherability of such compounds. His examples are all injection moulded test bars, which are not representative of the thin films used in shades and the processes by which they are made. Levchik gives no teaching on how to make a transparent, clear shade product or anything else that meets the FR requirements of the DIN 4102: B2 test and which does not yellow on aging. The B2 test is one of the toughest standards to meet, so if anything Levchik would teach away from the present invention in that it teaches that you would need to add the char forming polymer to a polyester containing a P based FR. Since, the great majority of polymers are mutually incompatible, the expected result of adding a high char polymer i.e. phenolic to PET, would be a cloudy, hazy mixture at best.

Levchik is silent on how to make a clear transparent FR PET, it is likewise silent on how to make an FR PET that would pass the B2 test, it is absolutely of no use in telling anyone how to make our invention. Since Valinski does not teach how to make a product that would pass the B2 test and is silent on the matter relating the mutual positioning of the PET layer



with UVA and the FR material, the combination of Valinski with Levchik does not render the present Invention obvious.

17b. WO96/06885 (Blundell) has been cited to show that RDP can be added to urethanes without migration to the surface (page 4) so making it obvious to replace the brominated FR in Valinski with RDP. A person skilled in the art would know that just because a compound such as RDP is non-migratory in a polyurethane foam at 100C, this is not indicative of how it will behave in an isocyanate crosslinked polyester PS adhesive (polyester urethane for short) in a window film application. The two materials and their different physical form and environments are too dissimilar to enable any correlation or inference about the solubility characteristics of RDP in our adhesive material from consideration of Blundell. Moreover nothing at all can be inferred about the temperature dependence of solubility coefficients of RDP in the two materials - that is just too uncertain and difficult even for those highly skilled and experienced in the art. Furthermore Blundell gives no teaching whatsoever as to the effect of light exposure on FR material.

17c. Pengilly (US 4185 046) acknowledges that too much FR in the adhesive of his invention ruins the optical properties. The FR used in the present adhesive to achieve DIN 4102:B2 compliance is RDP and not the Bromine based FR disclosed in Pengilly. Pengilly gives no teaching on how to

make a transparent, clear FR shade that meets the standard of the DIN 4102:B2 test. The examiner is wrong to say that, since Pengilly tells us to control haze by the level of FR used then we can simply select a level of FR that simultaneously gives us low haze and passes the B2 test. The teaching from Pengilly would tell us to use a Bromine based FR material, as disclosed in Valinski, which we now know failed the test. Just because you want a particular result and can describe a route to it, it does not mean that it is always chemically possible.

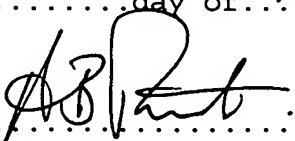
18. It is not obvious for one of ordinary skill to optimise clarity, weatherability and fire resistance in PET film composites. The present application describes the only commercially available FR shade product that meets the stringent fire regulations that have been in force in Europe since the early nineties (to my knowledge at least). A large team of professionally qualified Ph.D and graduate chemists, all skilled and experienced polymer technologists, has been working on the problem prior to, and after, Valinski and no suitable product has been developed by the Assignee or any other company until the present invention. This invention is the first to satisfy both the stringent requirements of the fire and flammability tests and be fit for the purpose of a transparent and clear solar control shade which has good weatherability.

19) I declare that all statements made in this declaration of my own knowledge are true, that all statements

made on information and belief are believed to be true, and further these statements are made with the knowledge that wilful false statements and the like are punishable by fine or imprisonment or both under section 1001 of Title 18 of the United States Code, and that such wilful false statements may jeopardize the validity of any Patent that may issue from the present application.

Respectfully submitted

this <sup>7<sup>th</sup></sup>.....day of May.....2007

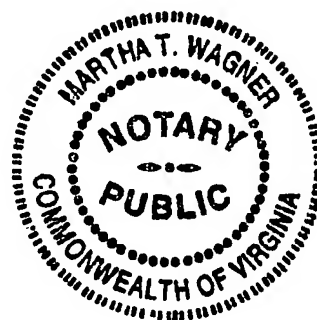
.....  


Anthony Brian Port

Witnessed by: Martha T. Wagner (Signature)  
Martha T. Wagner Notary Public (Name)

this <sup>7<sup>th</sup></sup>.....day of May.....2007

My Commission Expires:  
May 31, 2009



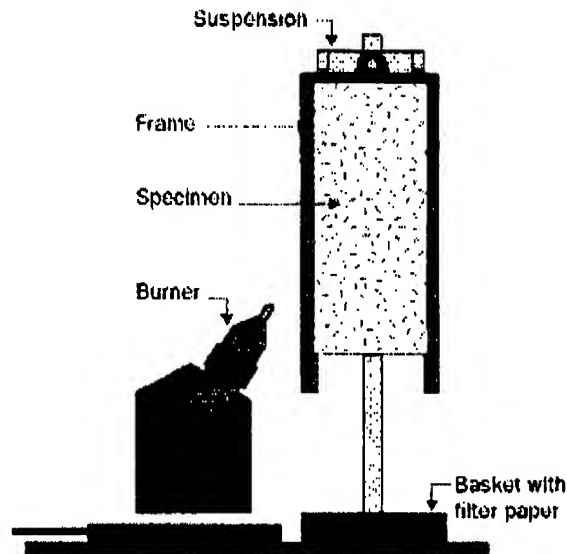
## EXHIBIT A

**Germany**

In Germany, upholstery fabrics are tested in accordance with DIN 4102 which has been established by the Deutsches Institut für Bautechnik.

**DIN 4102 Part 1 - Klelnbrönnner (B2)**

All materials used in buildings in Germany need to meet the B2 requirement which is determined using a small flame test.

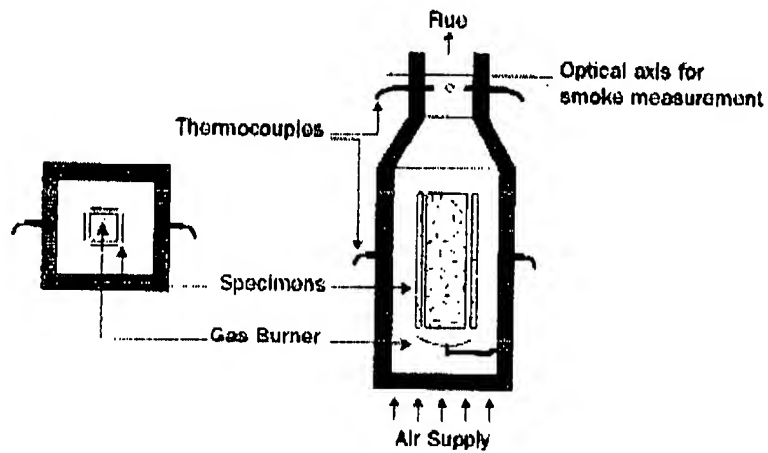


The fabric specimen is suspended vertically and a 20mm high flame is applied for 15 seconds to both the fabric surface and edge. Reference lines are marked on the specimen, which achieves B2 classification if the tip of the flame does not reach the reference marks within 20 seconds on any sample. 5 samples are tested with filter paper being placed below each to determine the production of flaming droplets.

**DIN 4102 Parts 15/16 - Brandschacht (B1)**

Referred to as the "Brandschacht test", this is the main test method in Germany which measures reaction to fire and is considered the highest flammability standard in the country for upholstery fabrics.

The term Brandschacht, literally "fire shaft", refers to the testing apparatus itself which consists of a square-shaped vertical housing equipped with a gas burner. Four fabric samples are held vertically in a supporting frame and subjected to flames for 10 minutes. At the same time a constant, uniform flow of air is blown into the Brandschacht from below.



In evaluating the test, smoke gas temperature and the mean residual length of the sample are taken into account (residual length is the part of the specimen which has escaped burning). In order to be classified as B1, the tested fabric must show:

1. A mean residual length of not less than 150mm, with no specimen being burned away completely
2. A mean smoke gas temperature of less than 200°C

EXHIBIT B

Our ref: 119019  
Your Order No:UK2896  
14 June 2001

Mr D Newbitt  
CP Films Solutia UK Limited  
13 Acorn Business Centre  
Northarbour Road  
Cosham  
Portsmouth  
PO6 3TH

Dear Mr Newbitt

We enclose a copy of our laboratory record sheet relating to the test to DIN 4102: Part 1: Section 6.2 (B2), which was recently performed on specimens of your nominally 0.15mm thick embossed shade film, product referenced "RS2G".

The specimens were supplied by yourselves on 10<sup>th</sup> May 2001. Warrington Fire Research Centre was not involved in any sampling or selection procedure.

Five specimens were tested with the test flame applied to the bottom edge of the specimen for 15 seconds, in accordance with the test procedure specified in clause 6.2.5 of the Standard. Five specimens were tested with the test flame applied to the surface of the specimen for 15 seconds, in accordance with the test procedure specified in Clause 6.2.5 of the Standard.

The specimens are designated "B3".

On receipt of a full description of the specimens tested, we shall be pleased to issue our formal report relating to this investigation. In order to streamline our procedures and offer the best service to our clients, we need the description to be provided within 28 days of the date of this letter, after which time, the file to this investigation will be closed. If after this period has elapsed, you then provide a description, it will be necessary to re-open the file in order to prepare the report. In these circumstances, an additional administration charge of £50.00 will be made. This letter is for your information only and should not be used as a substitute for the formal report, which will include the full details required by the Standard. The test cannot be claimed to be in accordance with the Standard until the test report is issued.

Yours sincerely

A handwritten signature in black ink, appearing to be 'C. Dean', with a horizontal line extending to the right.

**C DEAN**  
Senior Technical Officer -  
Reaction to Fire Testing

(PC6291W)

WARRINGTON FIRE RESEARCH CENTRE

Holmesfield Road  
Warrington WA1 2DS  
Tel: (01925) 655116  
Fax: (01925) 648672

WARRES No: 119019

Test : Formal

Date: 25<sup>th</sup> May 2001DIN 4102:PART 1LABORATORY RECORD SHEET

CLIENT .....CP FILMS SOLUTIA UK LIMITED.....OBSERVERS.....

MATERIAL DESCRIPTION...Embossed shade film, product reference "RS2G".....

.....THICKNESS.....0.15mm.....

FACE TESTED ...DULL..... SUBSTRATE ..... ADHESIVE .....

TEST FLAME APPLICATION POSITION - SURFACE

SPECIMEN NUMBER	Time from start of test for flame front to reach test mark (seconds)	Duration of flaming from start of test (seconds)	Any flaming droplets produced
1	Did not Reach	22	None
2	Did not Reach	15	None
3	Did not Reach	40	None
4	13	17	None
5	Did not Reach	16	None

OBSERVATIONS:

In the case of specimen No.1, the flame tip reached up to a maximum distance of 14cm by 10seconds.

In the case of specimen No.2, the flame tip reached up to a maximum distance of 7cm by 9seconds.

In the case of specimen No.3, the flame tip reached up to a maximum distance of 11cm by 14seconds.

In the case of specimen No.4, the flame tip reached up to a maximum distance of 15cm by 13seconds.

In the case of specimen No.5, the flame tip reached up to a maximum distance of 12cm by 10seconds.

Tested By:.....T MORT.....

**WARRINGTON FIRE RESEARCH CENTRE**

Holmesfield Road  
Warrington WA1 2DS  
Tel: (01925) 655116  
Fax: (01925) 646672

WARRES No: 119019

Test : Formal

Date: 25<sup>th</sup> May 2001**DIN 4102:PART 1****LABORATORY RECORD SHEET**

CLIENT .....CP FILMS SOLUTIA UK LIMITED.....OBSERVERS.....

MATERIAL DESCRIPTION...Embossed shade film, product reference "RS2G".....

.....THICKNESS.....0.15mm.....

FACE TESTED ....DULL..... SUBSTRATE ..... ADHESIVE .....

**TEST FLAME APPLICATION POSITION - EDGE**

SPECIMEN NUMBER	Time from start of test for flame front to reach test mark (seconds)	Duration of flaming from start of test (seconds)	Any flaming droplets produced
1	Did not Reach	15	None
2	Did not Reach	15	None
3	Did not Reach	15	None
4	Did not Reach	16	None
5	Did not Reach	15	None

**OBSERVATIONS:**

In the case of specimen No.1, the flame tip reached up to a maximum distance of 13cm by 6seconds.

In the case of specimen No.2 and No.5, the flame tip reached up to a maximum distance of 10cm by 5seconds and 9seconds respectively.

In the case of specimen No.3, the flame tip reached up to a maximum distance of 6cm by 3seconds.

In the case of specimen No.4, the flame tip reached up to a maximum distance of 11cm by 8seconds.

Tested By:.....T MORT.....



EXHIBIT 'C'

Our ref: 135548  
Your Order No: 18487  
07 November 2003

Ms L Stephens  
CP Films Solutions UK Limited  
Chadwick Road  
Astmoor Industrial Estate  
Runcorn  
Cheshire  
WA7 1PW

Dear Ms Stephens

We enclose a copy of our laboratory record sheet relating to the test to DIN 4102: Part 1: Section 6.2 (B2), which was recently performed on specimens of your nominally 0.15mm thick shade film (product reference "D2482").

The specimens were supplied by yourselves on the 21<sup>st</sup> October 2003. Warrington Fire Research Centre was not involved in any sampling or selection procedure.

Five specimens were tested with the test flame applied to the bottom edge of the specimen for 15 seconds and five specimens were tested with the test flame applied to the surface of the specimen for 15 seconds, in accordance with the test procedure specified in clause 6.2.4 of the Standard.

The specimens are designated "B2".

On receipt of a full description of the specimens tested, we shall be pleased to issue our formal report relating to this investigation. In order to streamline our procedures and offer the best service to our clients, we need the description to be provided within 28 days of the date of this letter, after which time, the file to this investigation will be closed. If after this period has elapsed, you then provide a description, it will be necessary to re-open the file. In order to prepare the report, in these circumstances, an additional administration charge of £50.00 will be made. This letter is for your information only and should not be used as a substitute for the formal report, which will include the full details required by the Standard. The test cannot be claimed to be in accordance with the Standard until the test report is issued.

Yours sincerely

A handwritten signature in black ink, appearing to read 'J. Moore'.

J. MOORE  
Senior Technical Officer  
Reaction to Fire Department

**WARRINGTON FIRE RESEARCH CENTRE**  
**HOLMESFIELD ROAD**  
**WARRINGTON WA1 2DS**  
**Tel: (01925) 666116**  
**Fax (01925) 648672**

WARRSABT 135548

TEST: Formal

DATE: 5<sup>th</sup> November 2002

**DIN 4102: PART 1**  
**LABORATORY RECORD SHEET**

CLIENT: CP Films Solutia UK Limited

OBSERVERS:

MATERIAL DESCRIPTION: Shade film (product reference "D2492")

THICKNESS: 0.15mm

FACE TESTED: Silver

SUBSTRATE: --

ADHESIVE: --

**TEST FLAME APPLICATION POSITION - EDGE**

SPECIMEN NUMBER	Time from start of test for flame front to reach test mark (seconds)	Duration of flaming from start of test (seconds)	Any flaming droplets produced
1	Did not reach	9	None
2	Did not reach	8	None
3	Did not reach	14	None
4	Did not reach	12	None
5	Did not reach	7	None
<b><u>OBSERVATIONS:</u></b>  In the case of specimen No. 1, a maximum flame height of 8cm occurred at 7 seconds In the case of specimen No. 2, a maximum flame height of 10cm occurred at 6 seconds In the case of specimen No. 3, a maximum flame height of 10cm occurred at 13 seconds In the case of specimen No. 4, a maximum flame height of 8cm occurred at 8 seconds In the case of specimen No. 5, a maximum flame height of 6cm occurred at 5 seconds			

TESTED BY: T MORT

\*Indicative tests are normally performed in the same way as formal tests but on a reduced number of specimens. They are conducted only for the purposes of the sponsor of the test, mainly for research and development purposes. The full conditions of the Standard will not be complied with in terms of number of specimens tested, specimen construction and/or conditioning requirements. Indicative test results cannot be used as a substitute for formal test results obtained in accordance with the requirements of the standard.

WARRINGTON FIRE RESEARCH CENTRE  
HOLMESFIELD ROAD  
WARRINGTON WA1 2DS  
Tel: (01925) 655116  
Fax (01925) 646672

WARRRES NO: 136548

TEST: Formal

DATE: 5<sup>th</sup> November 2003.

DIN 4102: PART 1  
LABORATORY RECORD SHEET

CLIENT: CP Films Solutions UK Limited

OBSERVERS: -

MATERIAL DESCRIPTION: Shade film (product reference "D2402")

THICKNESS: 0.15mm

FACE TESTED: Silver

SUBSTRATE: --

ADHESIVE: --

TEST FLAME APPLICATION POSITION - SURFACE

SPECIMEN NUMBER	Time from start of test for flame front to reach test mark (seconds)	Duration of flaming from start of test (seconds)	Any flaming droplets produced
1	Did not reach	6	None
2	Did not reach	5	None
3	Did not reach	5	None
4	Did not reach	5	None
5	Did not reach	6	None
<b>OBSERVATIONS:</b> In the case of specimens No. 1, and No. 4, a maximum flame height of 6cm occurred at 4 seconds In the case of specimen No. 2, a maximum flame height of 4cm occurred at 3 seconds In the case of specimen No. 3, a maximum flame height of 6cm occurred at 4 seconds In the case of specimen No. 5, a maximum flame height of 6cm occurred at 3 seconds			

TESTED BY: T MORT

\*Indicative tests are normally performed in the same way as formal tests but on a reduced number of specimens. They are conducted only for the purpose of the sponsor of the test, mainly for research and development purposes. The full conditions of the Standard will not be complied with in terms of number of specimens tested, specimen construction and/or conditioning requirements. Indicative test results are not a substitute for formal test results obtained in accordance with the requirements of the standard.

EXHIBIT D  
1 OF 2

**BS EN 13823: 2002**

**Reaction to Fire Tests  
for Building Products  
Exposed to the Thermal  
Attack by a Single  
Burning Item**

**WF Report Number:**

**155542**

**Date:**

**22<sup>nd</sup> June 2006**

**Test Sponsor:**

**CP Films Solutia UK  
Limited**



**Warringtonfire Test Report No. 155542**

**BS EN 13823: 2002  
Reaction-To-Fire Tests for Building  
Products -  
Building Products Excluding Floorings  
Exposed to the Thermal Attack by a  
Single Burning Item**

**Sponsored By**

**CP Films Solutia UK Limited  
Chadwick Road  
Astmoor Industrial Estate  
Runcorn  
Cheshire  
WA7 1PW**



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## Test Details

<b>Purpose of test</b>	To provide data which, in conjunction with data from other test methods, will enable building products excluding floorings, to be classified in accordance with the Classification requirements specified in BS EN 13501-1: 2002. The test was performed in accordance with the procedure specified in BS EN 13823: 2002 and this report should be read in conjunction with that standard.
<b>Scope of test</b>	To determine the reaction-to-fire performance of construction products, excluding floorings and excluding products which are indicated in the EC Decision 2000/147/EC, when exposed to thermal attack by a single burning item (SBI) utilising the test procedures defined in BS EN 13823: 2002. There were no deviations from the defined procedures.
<b>Fire test study group/EGOLF</b>	Certain aspects of some fire test specifications are open to different interpretations. The Fire Test Study Group and EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed.
<b>Instruction to test</b>	The test was conducted on the 15 <sup>th</sup> and 16 <sup>th</sup> June 2006 at the request of CP Films Solutia UK Limited, the sponsor of the test.
<b>Provision of test specimens</b>	The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure.
<b>Conditioning of specimens</b>	The specimens were received on the 12 <sup>th</sup> June 2006 and were conditioned to constant mass at a temperature of $23 \pm 2^{\circ}\text{C}$ and a relative humidity of $50 \pm 5\%$ prior to testing.
<b>Test facility</b>	The SBI test facility at warringtonfire is constructed in accordance with the specifications detailed in BS EN 13823: 2002.
<b>Exposed face</b>	The grey face of the specimens was exposed to the heating conditions of the test when the specimens were mounted in the test position.



## Description of Test Specimens

**Test specimens** The description of the specimens given below has been prepared from information provided by the sponsor of the test. All values quoted are nominal, unless tolerances are given.

The test specimen comprised two walls (or wings) mounted into an aperture in a specimen trolley such that they formed a vertical 90° corner. The dimensions of the walls were as follows:

Short wall - 495 ± 5 mm long x 1500 ± 5 mm high  
Long wall - 1000 ± 5 mm long x 1500 ± 5 mm high

Each wall (or wing) consisted of the following product:

General description		A flame retardant grade, embossed, two ply, polyethylene terephthalate shade film product.
Trade name / product reference		"RS2 Grey FR/D2555"
Overall thickness		75 microns
Overall weight per unit area		0.032 kg/m <sup>2</sup>
Name of manufacturer		CP Films Inc.
Ply No. 1 (Test face)	Generic type	Flame retardant grade polyethylene terephthalate
	Trade name / product reference	See Note 1 Below
	Name of manufacturer	See Note 1 Below
	Colour	"Grey"
	Thickness	37.5 microns
	Finish details	Dyed
	Flame retardant details	See Note 2 Below
	Generic type	See Note 1 Below
Adhesive	Trade name / product reference	See Note 1 Below
	Name of manufacturer	See Note 1 Below
	Application rate	32m/min
	Application method	Gravure
	Trade name of flame retardant	See Note 1 Below
	Generic type of flame retardant	Phosphorous
	Amount of flame retardant	See Note 1 Below
	Supplier of flame retardant	See Note 1 Below
	Supplier of flame retardant	See Note 1 Below



Ply No. 2 (Reverse face)	Generic type	Flame retardant grade polyethylene terephthalate
	Trade name / product reference	See Note 1 Below
	Name of manufacturer	See Note 1 Below
	Colour	"Silver"
	Thickness	37.5 microns
	Finish details	Metallised
	Flame retardant details	See Note 2 Below
Details of how the plies are laminated together		The plies are gravure coated with adhesive which includes flame retardant additives. The two plies are then laminated together utilising a hot roll technique.
Brief description of manufacturing process		Metalized, dying, laminating and embossed.
Mounting and fixing details		The specimens were tested fixed to a "window" frame manufactured from 5mm steel sheet by means of aluminium foil tape.
Substrate details		12mm paper faced plasterboard having a density of 800kg/m <sup>3</sup>
Air Gap Details		A 40mm ventilated cavity was situated between the reverse face of the specimen and the plasterboard substrate.

**Note 1: The sponsor of the test has provided this information but at the specific request of the sponsor, these details have been omitted and are held on the confidential file relating to this investigation.**

**Note 2: The sponsor of the test was unwilling to provide this information**

The specimen walls (or wings) were placed in the trolley in accordance with the requirements of section 5.3 of the Standard.

Photographs of the installed product are appended as Plates 1 and 2 of this report.

Each wing was retained in the trolley using mechanical clamps which pushed the wing against a lip at the top and bottom of the aperture in the trolley.

The trolley incorporated a triangular propane sand burner of side length 250mm, which was positioned in the base of the corner formed by the two wings of the test specimen, with a horizontal separation of 40mm between the edge of the burner and the lower edges of the wings. The burner is referred to as the primary burner and has an output of 30kW. A secondary propane sand burner was attached to the fixed frame, beneath the hood but at the furthest possible distance from the specimen when the trolley was in place. The purpose of this burner is to obtain base line data without affecting the assembled specimen. The trolley incorporated a grill in its base and this was the sole source of ventilation for the test enclosure whilst the test was in progress. A plan view of the SBI apparatus is shown in Figure 1. A schematic illustration of the specimen housing and the exhaust system is shown in Figure 2.

## Test Results

### Results and observations

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

The test results relate only to the specimens of the product in the form in which they were tested. Small differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product which is supplied or used is fully represented by the specimens which were tested.

Observations made during the test and comments on any difficulties encountered during the test are given in Table 1.

A total of three specimens was tested. The following data relevant to Euroclassification of Building Products was obtained:

Parameter	Result			
	Specimen 1	Specimen 2	Specimen 3	Mean
FIGRA (W/s) ( <i>THR(t) threshold of 0.2MJ</i> )	8.13	0.00	0.00	2.71
FIGRA (W/s) ( <i>THR(t) threshold of 0.4MJ</i> )	8.13	0.00	0.00	2.71
THR 600s (MJ)	1.31	0.00	0.56	0.62
SMOGRA (m <sup>2</sup> /s <sup>2</sup> )	0.00	0.00	0.00	0.00
TSP 600s (m <sup>2</sup> )	23.21	19.74	27.42	23.45
Lateral Flame Spread to End of Specimen?	None	None	None	-
Fall of Flaming Drop/Particle?	None	None	None	-
Flaming of Fallen Particle Exceeding 10s?	None	None	None	-

Curves of time averaged rate of heat release contribution of the specimen (HRRav(t)), cumulative heat release (THR(t)), and Fire Growth Rate (FIGRA) are appended as figures 3 to 5. Curves of time averaged rate of smoke production (SPRav(t)), cumulative smoke production (TSP(t)) and smoke growth rate (SMOGRA) are appended as figures 6 to 8.

Interpretation of the test results given above in the context of Euroclassification of building products should be carried out using BS EN 13501 – 1 : 2002.

**Table 1**

Time		Observation
min	Sec	
5	06	In the case of each specimen the film shrank away from the flame in the region of burner flame impingement
26	00	End of test. In the case of each specimen all flaming ceased.

Note: Impingement of the burner flame onto the specimen commenced at 5 minutes.

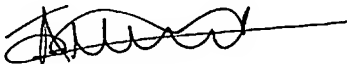
**Validity**

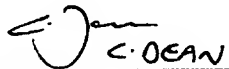
The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.


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## Signatories

  
Responsible Officer  
A. Myler\*

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Approved  
I. Moore\*  
Laboratory Supervisor

  
Head of Department  
P. E. Lythgoe\*

\* For and on behalf of warringtonfire.

Report Issued: 22<sup>nd</sup> June 2006

**Annex 1:**  
Test apparatus and installation Figures and Plates



Plate 1: Total View of the exposed surface of the long wing.

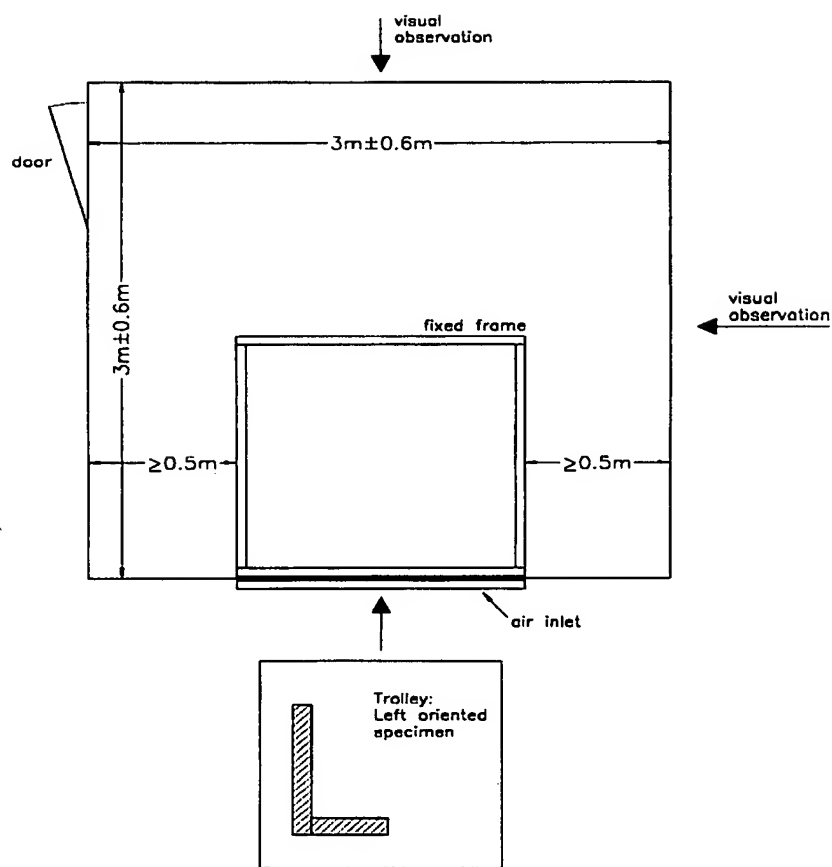


Plate 2: Close up view of the vertical outer edge of the long wing at a height of 500mm

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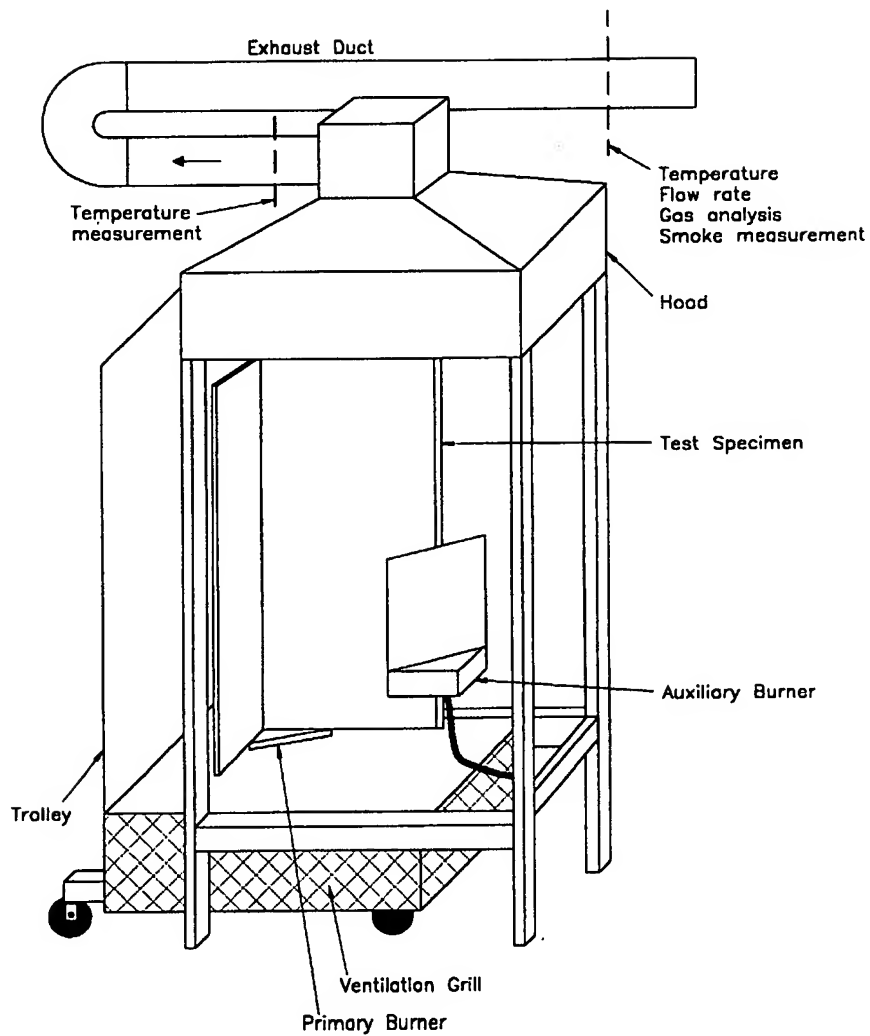
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Figure 1 - Plan View of SBI Apparatus



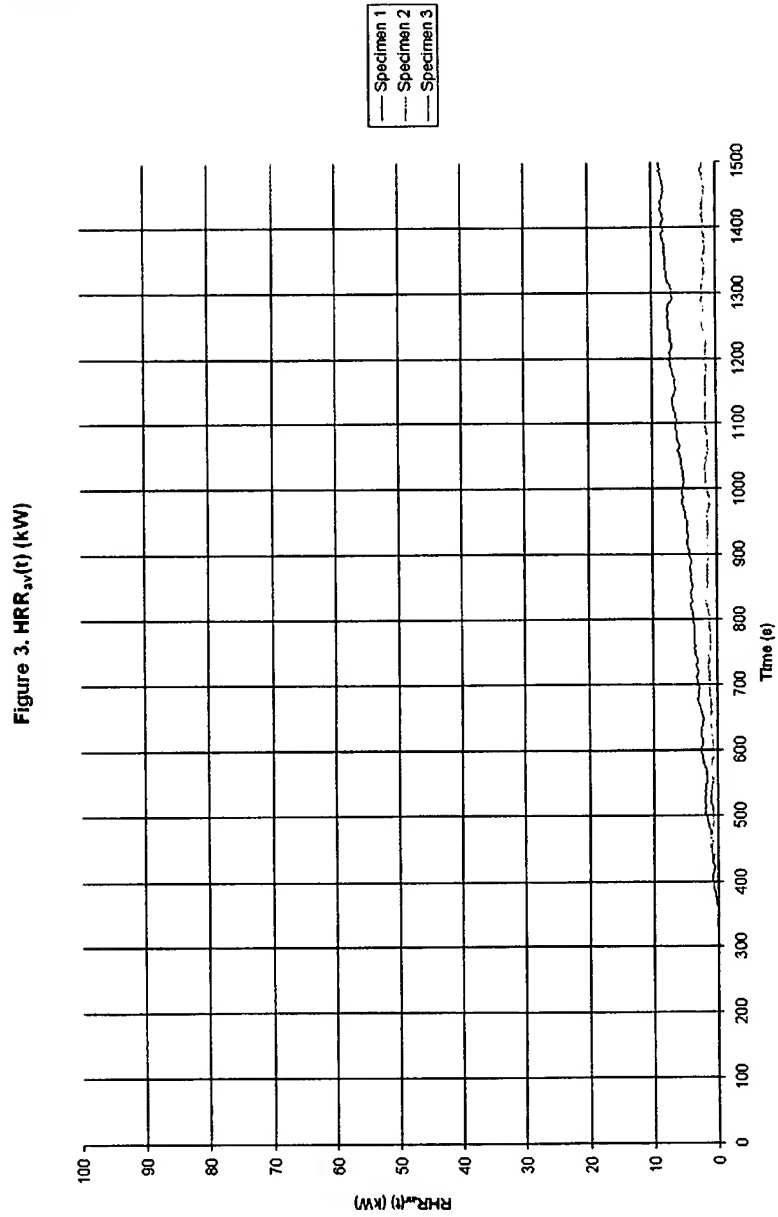
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Figure 2 - Test Apparatus (Schematic)





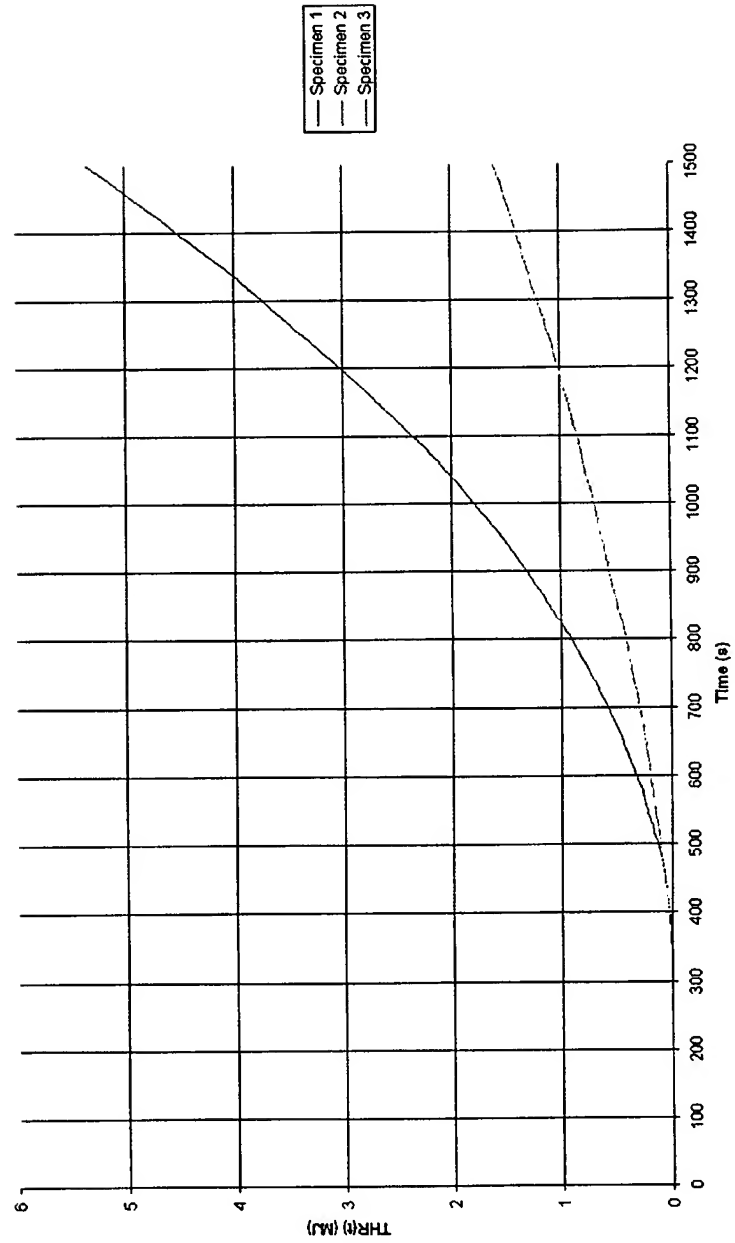
Annex 2: Graphs



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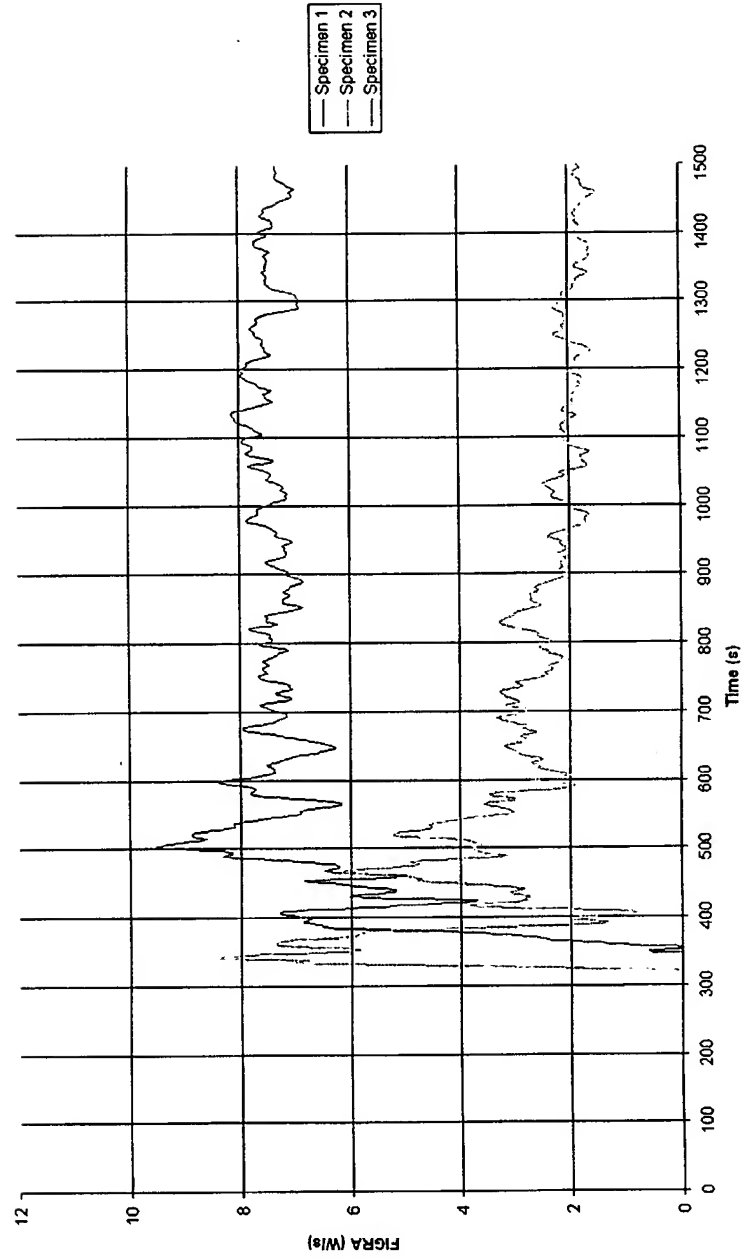
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Figure 4. THR(t) (MJ)



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Figure 5. FIGRA



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Figure 6.  $SPR_{sv}(t)$  ( $m^2/s$ )

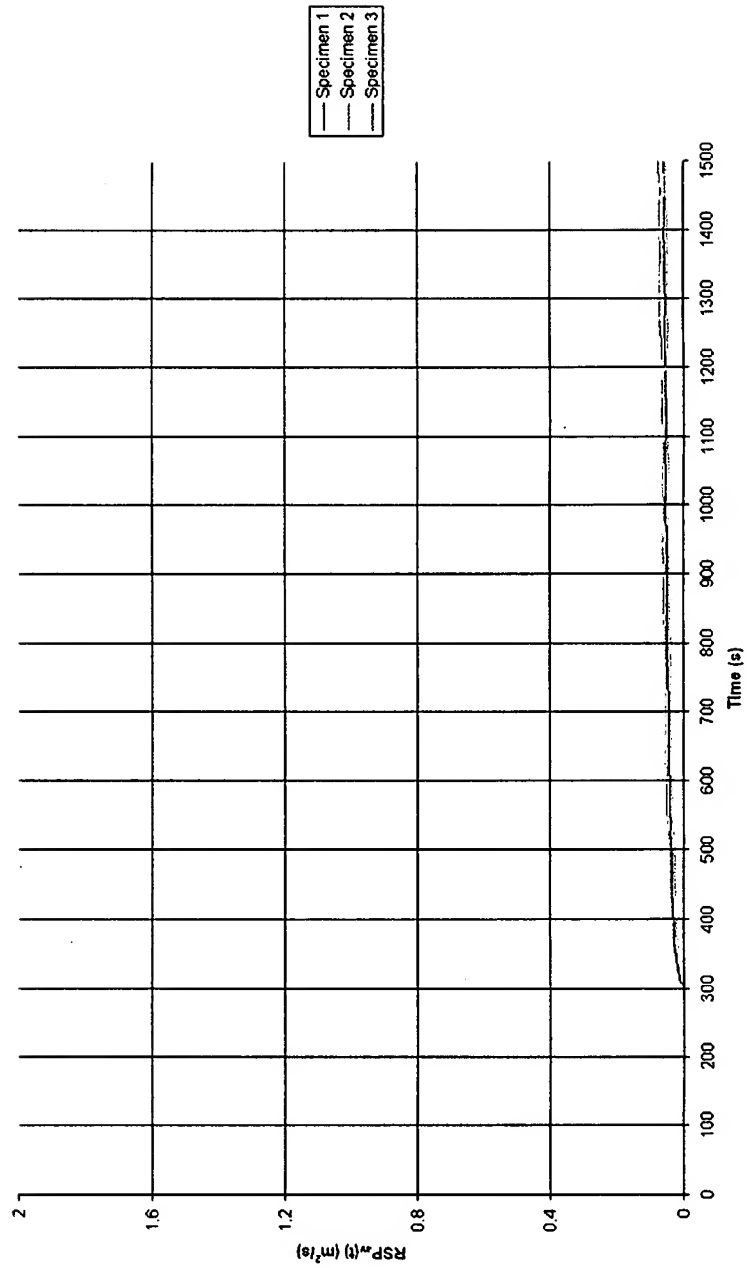


Figure 8. SMOGRA Graph.

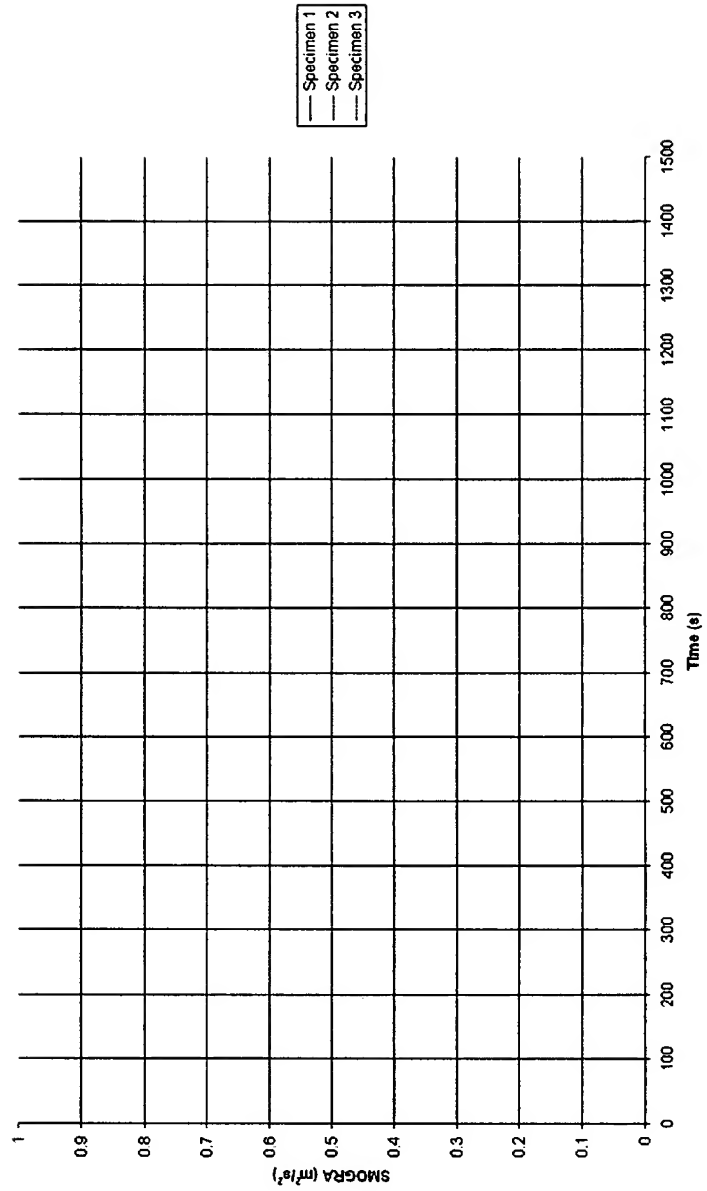
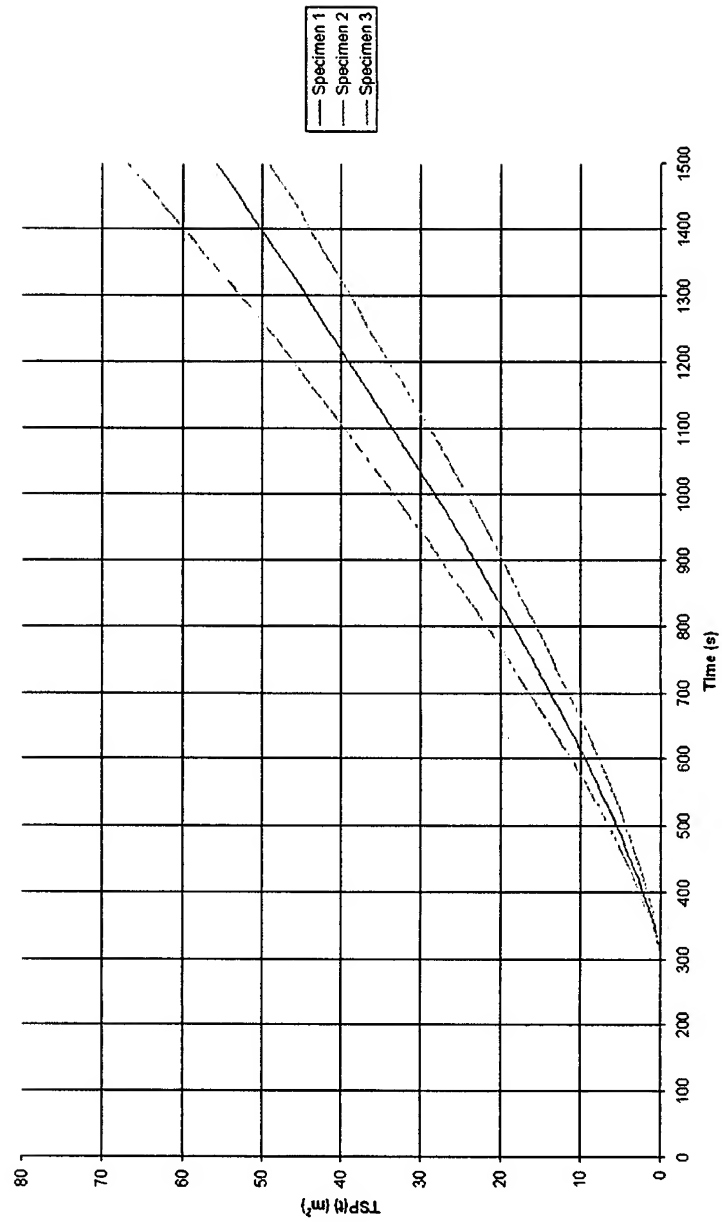


Figure 7. TSP(t) (m<sup>2</sup>)



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EXHIBIT D

20F2

108

**BS EN ISO 11925-2:  
2002**

**Ignitability Of Building  
Products Subjected To  
Direct Impingement Of  
Flame**

**WF Report Number:**

**155544**

**Date:**

**22<sup>nd</sup> June 2006**

**Test Sponsor:**

**CP Films Solutia UK  
Limited**



**0249**

**Warringtonfire Test Report No. 155544**

**BS EN ISO 11925-2: 2002**

**Reaction To Fire Tests - Ignitability Of  
Building Products Subjected To Direct  
Impingement Of Flame – Part 2:  
Single-flame Source Test**

**Sponsored By**

**CP Films Solutia UK Limited  
Chadwick Road  
Astmoor Industrial Estate  
Runcorn  
Cheshire  
WA7 1PW**





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TEST DETAILS.....	4
DESCRIPTION OF TEST SPECIMENS.....	5
TEST RESULTS.....	6
SIGNATORIES .....	7
Table 1 .....	8
Table 2 .....	8



## Test Details

<b>Purpose of test</b>	<p>To determine the performance of specimens of a product when they are subjected to the conditions of the test specified in BS EN ISO 11925-2:2002 "Reaction to Fire tests - Ignitability Of Building Products Subjected to Direct Impingement of Flame – Part 2: Single Flame Source Test".</p> <p>The test was performed in accordance with the procedure specified in BS EN ISO 11925-2:2002 Reaction to Fire Tests - Ignitability of Building Products subjected to direct impingement of flame – Part 2: Single Flame Source Test, and this report should be read in conjunction with that BS EN ISO Standard.</p>
<b>Scope of test</b>	<p>BS EN ISO 11925-2 specifies a method of test for determining the ignitability of building products by direct small flame impingement under zero impressed irradiance using specimens tested in a vertical orientation.</p>
<b>Fire test study group/EGOLF</b>	<p>Certain aspects of some fire test specifications are open to different interpretations. The Fire Test Study Group and EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed.</p>
<b>Instruction to test</b>	<p>The test was conducted on the 14<sup>th</sup> June 2006 at the request of CP Films Solutia UK Limited, the sponsor of the test.</p>
<b>Provision of test specimens</b>	<p>The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure.</p>
<b>Conditioning of specimens</b>	<p>The specimens were received on the 12<sup>th</sup> June 2006.</p> <p>Prior to test the specimens were stored for two days in a standard atmosphere as defined in BS EN 13238:2001 Conditioning Procedures and General Rules for selection of substrates until constant mass was achieved.</p>
<b>Substrate</b>	<p>The specimens were tested without a substrate present.</p>
<b>Flame application time</b>	<p>The flame was applied for thirty seconds</p>

## Description of Test Specimens

The description of the specimens given below has been prepared from information provided by the sponsor of the test. All values quoted are nominal, unless tolerances are given.

General description		A flame retardant grade, embossed, two ply, polyethylene terephthalate shade film product.
Trade name / product reference		"RS2 Grey FR/D2555"
Overall thickness		75 microns
Overall weight per unit area		0.032 kg/m <sup>2</sup>
Name of manufacturer		CP Films Inc.
Ply No. 1 (Test face)	Generic type	Flame retardant grade polyethylene terephthalate
	Trade name / product reference	See Note 1 Below
	Name of manufacturer	See Note 1 Below
	Colour	"Grey"
	Thickness	37.5 microns
	Finish details	Dyed
	Flame retardant details	See Note 2 Below
	Generic type	See Note 1 Below
Adhesive	Trade name / product reference	See Note 1 Below
	Name of manufacturer	See Note 1 Below
	Application rate	32m/min
	Application method	Gravure
	Trade name of flame retardant	See Note 1 Below
	Generic type of flame retardant	Phosphorous
	Amount of flame retardant	See Note 1 Below
	Supplier of flame retardant	See Note 1 Below
Ply No. 2 (Reverse face)	Generic type	Flame retardant grade polyethylene terephthalate
	Trade name / product reference	See Note 1 Below
	Name of manufacturer	See Note 1 Below
	Colour	"Silver"
	Thickness	37.5 microns
	Finish details	Metallised
	Flame retardant details	See Note 2 Below
Details of how the plies are laminated together		The plies are gravure coated with adhesive which includes flame retardant additives. The two plies are then laminated together utilising a hot roll technique.
Brief description of manufacturing process		Metalized, dying, laminating and embossed.

**Note 1:** The sponsor of the test has provided this information but at the specific request of the sponsor, these details have been omitted and are held on the confidential file relating to this investigation.

**Note 2:** The sponsor of the test was unwilling to provide this information



## Test Results

**Number of specimens tested** Eight specimens were tested, each of which were subjected to surface exposure to flame with the grey face exposed.

Six specimens were tested, each of which were subjected to edge exposure to flame with the grey face exposed.

**Applicability of test results**

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test, they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

The test results relate only to the specimens of the product in the form in which they were tested. Small differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product which is supplied or used is fully represented by the specimens which were tested.

The test results for the individual specimens, together with observations made during the test and comments on any difficulties encountered during the test are given in Tables 1 and 2.

**On the set of six specimens which was tested with surface exposure to flame, the flame tip reached a distance of 150mm before the end of the test on one out of the six specimens. In the case of the remaining five specimens the flame tip did not reach a distance of 150mm before the end of the test**

**In accordance with section 7.4 of EN 13501-1: 2002 a further two specimens were tested with surface exposure to flame. In the case of both specimens, the flame tip did not reach a distance of 150mm before the end of the test.**

**On the set of six specimens which were tested with edge exposure to flame, the flame tip did not reach a distance of 150mm before the end of the test.**

**Validity**


The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

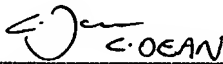
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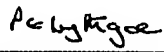


## Signatories

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Head of Department  
P. E. Lythgoe \*

\* For and on behalf of warringtonfire.

Report Issued: 22<sup>nd</sup> June 2006

**Table 1**

**Test Flame Application Position - Surface Of Grey Face**

Specimen No.	Ignition Yes/No	Time from start of test for flame tip to reach 150mm (seconds)	Extent of Flame Spread (mm)	Flaming Debris	Glowing	Extent of Damaged Area (mm)	
						Height	Width
1	Yes	Did not reach	40	None	None	110	75
2	Yes	15	160	None	None	215	85
3	Yes	Did not reach	70	None	None	135	85
4	Yes	Did not reach	40	None	None	110	75
5	Yes	Did not reach	70	None	None	85	50
6	Yes	Did not reach	50	None	None	90	45

In accordance with section 7.4 of EN 13501-1: 2002 a further two specimens were tested with surface exposure to flame and the results were as follows:

Specimen No.	Ignition Yes/No	Time from start of test for flame tip to reach 150mm (seconds)	Extent of Flame Spread (mm)	Flaming Debris	Glowing	Extent of Damaged Area (mm)	
						Height	Width
7	Yes	Did not reach	40	None	None	80	25
8	Yes	Did not reach	60	None	None	80	25

**Table 2**

**Test Flame Application Position - Edge Of Grey Face**

Specimen No.	Ignition Yes/No	Time from start of test for flame tip to reach 150mm (seconds)	Extent of Flame Spread (mm)	Flaming Debris	Glowing	Extent of Damaged Area (mm)	
						Height	Width
1	Yes	Did not reach	50	None	None	90	20
2	Yes	Did not reach	50	None	None	90	40
3	Yes	Did not reach	50	None	None	65	20
4	Yes	Did not reach	110	None	None	140	80
5	Yes	Did not reach	60	None	None	80	60
6	Yes	Did not reach	80	None	None	120	85